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ARCHITECTURE IN THE USSR

Engineer B. Barsky, President of the Building Committee of the Supreme Council of National Economy, Moskva

The 50-billion-ruble five-year building program set up by the Congress of the Supreme Soviet has made it necessary to adopt special measures to eliminate the shortage of building materials and compensate for the lack of practical experience in modern architecture. These measures extend to the establishment of a designing office with the task of standardizing buildings, the setting up of new building regulations, employment of building machines, preparations for research on building in winter, increase in the number of urban building enterprises, promotion of the manufacture of building materials, setting up of a plan to reorganize technical studies, calling in of foreign experts. Engineer Barsky reports on the present status of the work connected with this matter.

The industrialization of national economy in the USSR calls for an intensive building program. The five-year economic plan was unanimously approved in May 1929 by the Sixth Congress of the Supreme Soviet. The total scheme of the plan, which is at present attracting the attention of the entire Soviet public, provides for a 50-billion-ruble five-year building program. Seventeen billion rubles of this amount are earmarked for industrial building. The entire magnitude of the program becomes clear in view of the following facts: development of actual industrial building did not start in Imperial Russia until just before World War I; shortly afterward it was interrupted until 1926 by the World War I and the Revolution (the period between 1922 and 1926 was devoted exclusively to reconstruction of industry destroyed during World War I and the Revolution.)

A detailed investigation and severe criticism of our present building activity was necessary to solve all the problems connected with this tremendous plan. The conclusions reached should carry weight in mapping out the future development of the building industry. The government of the USSR, with its usual resoluteness, conducted this investigation into

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all purposes of building and established first of all that there had been an enormous rise in the cost of building work. The average rise amounted to 75 percent, and for many phases of the work, even 140 percent. Nearly all building materials too had increased 100 percent in cost, except iron and cement, which increased only 46 percent. In addition, the quality of building materials does not always conform to modern requirements and their manufacture is inadequate for the constantly increasing building industry requirements. The following shortages in the most important building materials are expected for the current year 1929 : cement, 15 percent of the requirements; brick, 18 percent; iron, 25 percent.

This shortage of building materials appears to be a very serious matter in view of this year's five-billion-ruble building program, about 1.9 million rubles of which are to be expended on industrial building. Additional difficulties are presented by the shortage of suitable technical personnel and the lack of practical experience in modern architecture (the result of placing the emphasis on theoretical training in our higher schools). A series of measures which I shall proceed to explain were necessary to eliminate these defects.

The Problem of Designing

Since our engineers lacked experience in designing large plant installations, designs were never completed on time and were often inadequately worked out. Thus, considerable changes had to be made during the course of construction. State designing offices for all branches of industry were set up last year to rationalize designing work. Of course these newly established designing offices were not in a position to bring about any great improvement in designing in one year. However they made it possible to bring together outstanding experts in the different fields of industry and to procure technical archives which have facilitated the study of former building activity. Both European and American experts participated in the work of these institutes. For example, the GIPROMEZ, the office for designing metallurgical plants and machine-building factories, made a contract with the Freyn Co, an American firm, which made 30 experts available to us. Thanks to the kind assistance of Professor Klöckner, Darmstadt, we were able to secure several German and Austrian experts for the work in the USSR.

One of the most important tasks of our newly organized designing office is the standardization of our buildings. The comprehensiveness of our building program fosters such standardization. When simultaneous construction is being carried out on five or six cement factories, several brick factories, and several similar metallurgical plants, textile plants, and electric power plants, standardization of the buildings assumes increasing importance and brings about many important advantages, for example, prompt completion of designs, standardization of building site equipment and of building operations.

New Building Regulations

The regulations and industrial construction standards prevailing at present may be designated as extremely obsolete. For this reason the formulation of new building regulations was undertaken in 1926. The standards were, for the most part, derived from old German building regulations and were characterized by high safety figures and amortization periods thus creating a discrepancy between the life span of the buildings and of the built-in manufacturing equipment. The rapid development of modern engineering necessitates frequent renovation of industrial plants. For

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this reason extra large buildings are an obstacle to industrial rationalization. It may often be observed that renovations followed the model of existing structures rather than the latest modern technical requirements. These circumstances induced us to follow the American model both for technical standards and in determining the life span of the industrial structures, since, in our opinion, those very questions have been most satisfactorily solved in America. With this point of view, we changed our building standards and carried out many simplifications even before the new building regulations went into effect. Of course, the new building regulations cannot comprehend and solve all standardization questions. For this reason, it is necessary that our engineering research institutes turn their entire attention to both the problem of new construction and research on modern building materials. An extensive enlargement of existing laboratories for engineering practice and considerable sums of money for research buildings permit the satisfactory organization of the study.

Ventilation of plant installations represents a special field of study. For the most part, Germany and America make use of natural ventilation. In our opinion this is inadequate, particularly under the climatic conditions of the USSR. In the USSR, the development of ventilating installations is being particularly promoted. This sometimes leads to great and not always justified expense. For this reason an attempt is being made to develop a ventilation system which, by combining natural and artificial ventilation, will keep building costs to a minimum but at the same time will keep the production rooms supplied with fresh air.

Organization of construction work

The proper organization of our construction work may be called the crux of our building activity. Our engineers' lack of experience in the former activity brings about an intolerable delay in building processes and an inefficient employment of labor and building machines. The building machines sometimes achieve only 30 percent of their guaranteed performance capacity. Building material consumption is excessively large. This is partly to be attributed to the usual wastedoring the procurement of building material. The preparation of the building material, the fabrication of individual structural parts, the production of mortar, concrete, etc., are carried out at the individual building sites. This makes it necessary to procure promptly the year's supply of building material and to store it on the building site. Mixing installations, testing laboratories, bending machines with forges and workshops are set up separately for each large construction project. This procedure can be only partially explained by the size of the country.

It is entirely possible to concentrate the preparation of building materials in the larger cities. Thus, our efforts are directed towards restricting operations on the actual building site to the erection of previously completed structural parts. A comprehensive and prompt preparation of building-site equipment and a careful organization of building operations is necessary for the other building sites. We invited several German experts to come to Russia as directors of building operations so that we might avail ourselves of German experiences in this field.

The question of mechanization merits particular consideration. We have not yet succeeded in using building machines properly nor in exploiting them to their full capacity. Two viewpoints are apparent in

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our construction engineering circles. One of these proposes that we follow the American model in our building methods, the other proposes following the German model. My acquaintanceship with German building methods, although short, induced me to decide in favor of the second proposal, since it is my opinion that German experiences conform more closely to conditions prevailing here. Therefore, I decided in this instance, too, to secure predominantly German experts for collaboration on the mechanization work.

Another great task confronts us in the field of construction machinery since the comprehensiveness of our building program and the necessity of accelerating its tempo make more mechanical equipment necessary.

Building Operations during Frost Period

The possibility of uninterrupted building operations throughout the year plays an extremely important role in view of the unfavorable climatic conditions of many regions (Northwest Region, Central Industrial Region, the Urals, Siberia). Here winter often lasts five to seven months or more. Formerly, heating the building areas was considered the only possible way of carrying out construction in winter. This procedure is expensive but worthwhile, if the structure must be completed speedily. The severe winter in Europe this year showed that the German building sites are protected but little against frost. However, these temperature conditions when compared with ours still must be called favorable. A suitable solution of this problem would considerably cheapen and accelerate our building operations.

State Building Enterprises

In order to ensure the realization of the above-mentioned building program, it is necessary to increase further the number of existing State building enterprises. Formerly, building was carried out quite extensively under private management, but in the near future such construction work will be allotted instead to special State enterprises. The building plan of these enterprises amounts to 500 million rubles for the current year. We consider it necessary to increase the number of these enterprises so that they will be able to handle a billion-ruble building program. A large number of technical personnel are necessary to achieve this purpose. The difficulty in securing personnel will be partially eliminated by the fact that data on practical experience will be concentrated in the individual special enterprises.

Building Materials

The development of the entire building industry (industrial building, railroad construction, housing projects, etc.) involves a tremendous increase in building material consumption. A severe shortage of cement, bricks, iron, etc., became noticeable in 1928. The building material industry remained most backward until 1928 and considerable investment of capital was required to enable it to meet in some measure the needs of the growing building program. National capital investments amounted to 60 million rubles in 1928, 100 million rubles in 1929, and are estimated at 700 million rubles for the next five years. Such an increase in capital in addition to private and corporate capital will result in a 300-percent increase in cement production and a 400-percent increase in brick production. The above-mentioned amounts refer to mineral building materials only and therefore do not include iron and wood.

It is necessary to construct 40 new cement mills, about 400 brick factories, and 150 roofing tile factories to keep space of the growing

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consumption. In addition to these new buildings there is to be a complete revamping of existing plants. The difficulty of this tremendous task will be greatly intensified by the lack of technical personnel and suitable mechanical equipment. In the past we had no professional school for engineers of the silicate industry, and we procured equipment for cement, brick, and firebrick plants from foreign countries. The building of special machinery for the silicate industry has been started and during the current year the first cement kilns and other machines of domestic manufacture will be installed. Several foreign experts have also been invited in for the construction of new building material plants. In addition to promoting the production of artificial building materials we are also beginning to organize the production of natural building materials: trass (for cement admixture), asbestos (for slate slabs), peat (for insulation, peat insulation boards), purice stone, tuff, etc.

Questions of building material production require very special attention since shortages and poor quality in this department cause a considerable increase in the cost of buildings. The possibility of regulating the building material market according to Government discretion permits us to carry out this year's industrial building program without restrictions. However, a shortage of building materials will be unavoidable in all other phases of national economy. Exceptional efforts are necessary, in particular the speedy start of operations in new production plants, if all requirements are to be completely satisfied. The inexhaustible raw material resources of the USSR, the occurrence of many natural building materials will make it possible to handle this task in spite of many difficulties.

Technical Personnel

The training of technical personnel also constitutes an extremely serious task. The previously mentioned limited development of actual industrial building in Imperial Russia, the interruption of all building activity until 1926 resulted in a great shortage of experienced industrial construction engineers. According to statements of Aralov, director of the Administration for Technical Higher Schools, there will be a deficit of 30,000 engineers and 40,000 technicians for the last year of the Five-Year Plan (Industrial and Commercial News, 23 March 1929) in case no new technical higher schools are established. At present the proportion of technical personnel in industry as a whole amounts to 0.64 percent (the situation is even more unfavorable in the building industry.) We intend to increase this proportion to 1.8 percent. This will necessitate the establishment of a number of new professional schools and the expanding of existing educational institutions.

Public attention is now focused on the scope of the curricula of our technical higher schools. Formerly our higher schools produced engineers with a good general training, unspecialized theorists, without adequate practical knowledge. At present an effort is being made to produce engineers trained in only one definite but not too narrowly limited field. To be sure it is not such extensive specialization as is customary in Germany and even more so in America, but it is at any rate a renunciation of the previous general training. Higher schools are established in particular for industrial construction. The first attempt — the department of industrial construction in the Moskva Technical Higher School — was a brilliant success and produced well-prepared construction engineers for practical building operations. In addition we intend to reduce the course of study in the technical higher schools from five years (actually six or seven) to four years. We shall do this by eliminating from the program certain subjects that have no bearing on the main course of study and substituting other subjects which are, in our opinion, more essential; for example, building economy, building site

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equipment, and mechanization of building operations. At the same time, (in the summer semester of the present school year) compulsory building site and plant field work were introduced. These were to be partly completed before entering the higher school and partly during the school course.

The diploma is not presented until after the building site field work has been completed. The scope of the thesis was the subject of lively discussions. Formerly the writing of the thesis required much time and effort (averaging one year). It comprised 15 - 20 sheets and had to be worked out extremely carefully (with India ink and colors). The proposal was made to accept the system of the German technical schools, i.e., a diagrammatic thesis which would require only six to eight weeks for completion. This proposal was not carried out and then we made the decision to restrict the work on the project at the cost of the form rather than the content. This would reduce the time required for completing the thesis to about one-half year.

A thoroughgoing reorganization of the technical schools requires collaboration of both pedagogical and practical circles. Therefore all questions on this reorganization have been put up for discussion to the entire technical construction world. We also intend to call upon the invited foreign experts to collaborate in our higher schools.

Calling in of Foreign Experts

The great tasks that confront the USSR in the field of architecture are sufficiently evident even in this short article. We consider it absolutely necessary to utilize the experiences of foreign countries both at the building site and in the higher schools in carrying out our building program. We drew up guiding principles for collaboration between German and Soviet Russian expert circles during the German-Russian technical week (January 1929) when several German scholars paid us a visit. The previously mentioned invitations to foreign experts to accept permanent work in the USSR constitutes the first step in this direction. In March and April of this year Professors Kleinlogel, Meyer, and Dr Kelen visited our building sites to become more closely acquainted with our building methods. The scope of our building program, the existence of extremely noteworthy engineering projects such as the Dnepr power plant, the Volga-Don Canal, the large metallurgical plants, etc., will undoubtedly attract the attention of the circle of foreign experts.

We hope that we shall succeed in securing an increasing number of foreign experts to collaborate with us in carrying out our tremendous industrialization program. However, we are by no means aware of the difficulties that face us in carrying out the program.

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